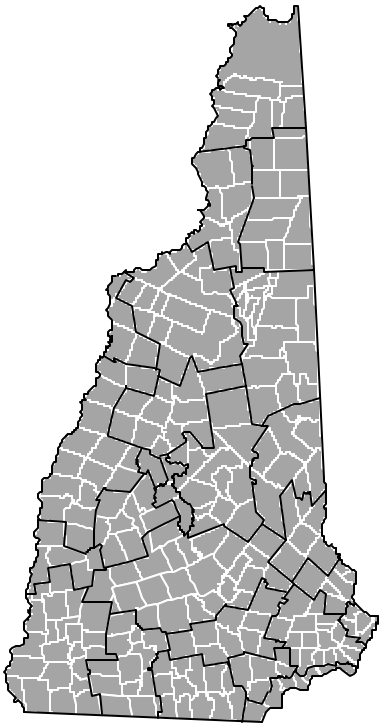
New Hampshire Regional Health Profiles

Technical Notes



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INTRODUCTION

The aim of the Regional Profiles is to present data in a format that facilitates a better understanding of the health of the State's communities and to support health care planning at the local level.

A primary data source used in the development of the ***Regional Profiles*** was the ***Assessing New Hampshire's Communities: Primary Care Access Data, 1993-1997*** (NH Department of Health and Human Services, Office of Community and Public Health, Division of Epidemiology and Vital Statistics). This document is available from the Office of Community and Public Health and is offered electronically at the Department's Web site (http://www.dhhs.state.nh.us/healthstats under "Reports") and is referred to as the PCAD in the ***Regional Profiles***. Additional primary data sources used were the 1999 New Hampshire Health Insurance Coverage and Access Survey, the Uniform Hospital Discharge Data Set, and the 1990 US Census. The *Data Sources* and *Definitions* sections below have been extracted from the PCAD and augmented to cover the data used in the ***Regional Profiles***. The reader is encouraged to consider the *Methods* section of the PCAD for an in-depth discussion of how this source document was developed.

The morbidity and mortality data in the ***Regional Profiles***, including the data related to ambulatory care sensitive conditions, were organized according to the International Classification of Diseases, ninth revision, (ICD-9), was used for identifying specific conditions presented in the statewide and Hospital Service Area (HSA) assessments and are the same codes used in the PCAD. However, in some cases the codes in the ***Regional Profiles*** were grouped to define a clinical concept not discussed in the PCAD (for example, rapid onset ambulatory care sensitive conditions). The *ICD Codes* section of these Technical Notes presents the ICD-9 Codes as grouped for use in the ***Regional Profiles***.

HSAs as the unit of analysis are discussed in the Introduction to the ***Regional Profiles*** and the reader is referred to the PCAD for an in-depth discussion of how Hospital Service Areas, the basis for the Healthcare Service Areas used in the ***Regional Profiles***, were defined and developed and how rates were developed and tested. These methods served as the bases of the methods for the ***Regional Profiles***. Although HSA rates used in the ***Regional Profiles*** were calculated using PCAD methodology, these rates were also age adjusted. The ***Regional Profiles*** used the same statistical test and methodology as that used in the PCAD for testing for the significance of differences between an HSA rate and the State rate. The development of age adjusted rates, the calculation of confidence intervals, and the statistical test for significance are discussed below, as is the data related to the 1999 New Hampshire Health Insurance Coverage and Access Survey.

Presented the end of this section are the indicators recommended by the Institute of Medicine (Improving Health in the Community,-Institute of Medicine; National Academy Press; 1997) and the Centers for Disease Control and Prevention ("Consensus Set of Health Indicators for the General Assessment of Community Health Status - United States," MMWR, 40, 27:449) for use in considering health status of the population. The selection of indicators used in the ***Regional Profiles*** was influenced greatly by these sources.

The ***Regional Profiles*** presents HSA rates and supplemental data in three formats: (a) an HSA unique narrative, (b) data tables - by indicator - for all HSAs, and (c) figures (graphs) - by indicator – for all HSAs. State level maps, and for certain indicators, maps of the Manchester and Nashua HSAs, were also developed as an assist to readers in understanding the distribution of differences in the data between HSAs that were statistically significant.

A. Data Sources

New Hampshire State Cancer Registry

Years: 1993-1997

Data: Registry records of all cancers, and of breast, colon and lung cancers individually, as presented in PCAD. Cancer Registry data is available at http://www.dhhs.state.nh.us/healthstats

U.S. Census Bureau

Years: 1990

Data: Census 1990 data by zip-defined HSA extracted from the STF3B database available at http://venus.census.gov/cdrom/lookup.

The Dartmouth Atlas of Health Care: *The New England States*

Years: 1992–1996

Data: MEDPAR data, age/sex-adjusted and calculated by The Center for the Evaluative Clinical Sciences at Dartmouth Medical School. Additional information is available at http://www.dartmouthatlas.org/.

Dartmouth-Hitchcock Alliance, Office of Strategic Planning

Years: 1993–1998

Data: Database of Uniform Hospital Discharge Data combining acute care hospitalization data from New Hampshire, Vermont, Massachusetts, Maine and New York hospitals.

New Hampshire Department of Health and Human Services, Office of Community and Public Health, Bureau of Vital Records

Years: 1993–1997

Data: Vital Records data as presented in PCAD from birth certificates for calculations of birth health status and maternal behaviors and barriers to infant health. Death certificate data for mortality rate calculations. Vital Records data is available at http://www.dhhs.state.nh.us/healthstats

New Hampshire Department of Health and Human Services, Office of Community and Public Health, Bureau of Health Statistics and Data Management

Years: 1993-1997

Data: Acute Care Uniform Hospital Discharge Data Set (UHDDS) as presented in PCAD

New Hampshire Health Insurance Coverage and Access Survey

Years: 1999

Data: Calculated rates from telephone survey of New Hampshire residents under the age of 65, designed to understand health insurance coverage, access to health care, and

general medical needs. Documentation is available at: http://www.dhhs.state.nh.us/Planning/HlthCSys.nsf/ under Health Insurance Coverage.

New Hampshire Department of Health and Human Services, Office of Economic Services
Years: 1997 and 1998
Data: Medicaid services based on July 1st caseloads, as presented in PCAD.

New Hampshire Department of Employment Security
Years: 1999
Data: Annual average unemployed in HSA towns and annual average labor force.

B. Definitions: PCAD and Regional Profiles

Ambulatory Care Sensitive (ACS) Conditions: Medical conditions that are less likely to require inpatient hospitalization if timely and appropriate primary care is received.

ACS Chronic Conditions: Chronic conditions, such as diabetes, for which routine care in an ambulatory setting, such as a doctor's office or clinic, might prevent need for hospital admissions.

ACS Rapid Onset Conditions: ACS conditions that may develop quickly, such as pneumonia

Birth Rate: Average annual number of live births to women in the 15 to 44 age range divided by the 1995 estimated female population in the age range (per 1,000 females).

Diabetes-Related Mortality Rate: Average annual number of deaths with any listed multiple causes of death, either underlying or contributing; identified as Diabetes (ICD-9 code 250) divided by the 1995 population (per 1000 population)

Families/Population Below 200% of the Federal Poverty Level: Number of individuals/families who reported incomes below 200% of the Federal Poverty Level established by the US Department of Health and Human Services for 1999 (e.g., $27,760 for a family of three).

Hospitalization Rate: Average annual number of inpatient hospitalizations with specified condition codes divided by the 1995 population (per 1000 population)

Infant Risk Indicators: Number of births with a specified birth characteristic divided by the total number of live births with non-missing values for that characteristic (per 1,000 live births).

Inpatient Hospital Services: Services provided in a hospital setting to individuals who stay a minimum of one night. These do not include ambulatory care provided in a hospital setting or single day ambulatory surgical services provided in a hospital setting.

Late/No Prenatal Care Initiation: Prenatal care begun after the second trimester of pregnancy, or no prenatal care obtained.

Low Birth Weight: Birth weight less than 2500 grams (5.5 pounds).

Maternal Smoking: Tobacco use at any point during pregnancy, as reported by the mother.

Medicaid/Food Stamp Eligibility: Federal/State human services program providing financial assistance and medical care coverage to eligible low-income individuals.

Medicaid Payment: Those births where either prenatal care, delivery, or both were paid by Medicaid.

Mother Unmarried: Mothers, other than those identified as married at birth, conception, or at any time between.

Self Pay Admissions: Hospital admissions for services that are paid for by the individual rather than through insurance or other assistance program.

C. ICD-9 Codes: Grouped as Used in the Regional Profiles

International Classification of Diseases, ninth revision, are used for identifying specific conditions presented in the statewide and hospital service area assessment analyses.

Condition	Diagnosis	Comments
Internal Causes	1 - 799.8	*i.e.*, diseases or non injury
Cancer	140-239	
Breast	174-174.9	
Cervix	180-180.9	
Colon	153-153.9, 159-159.9	
Lung	162.2-162.9	
Prostate	185	
Diabetes-related	250-250.93	
Heart Disease	390-398.99, 402-402.91, 404-429.9	
Cerebrovascular Disease	430-439.9	
Chronic Obstructive Pulmonary Disease	490-496	
Injury Causes	E800-E999	Intentional and unintentional
Total Unintentional	E800-E949.9	
Motor Vehicle Accident	E810-E825	
Falls	E880-E888	
Total Intentional	E950-E969	
Suicide	E950-E959	
Firearm	E922-E922.9	Unintentional
	E965-E965.4, E970	Homicide
	E955.0-E955.4	Suicide
	E985.0-E985.4	Unknown
Obstetric	DRG 370-375	

Ambulatory Care Sensitive Conditions

Condition	Diagnosis	Comments
Congenital Syphilis	090-090.9	Secondary Diagnosis, Newborns only
Immunization-Preventable Conditions		
Pertussis	033-033.9	
Rheumatic fever without	390-391.9	
Tetanus	037	
Polio	045-045.9	
Haemophilus meningitis	320.0	All ages
Grand Mal Status and other epileptic convulsions	345-345.9	
Convulsions	780.3-780.39	All ages
Severe ENT Infections		
Supportive and unspecified otitis media	382-382.9	Exclude otitis media cases with myringotomy with insertion of tube (20.01)
Acute pharyngitis	462	
Acute tonsilitis	463	
Acute upper respiratory infection	465-465.9	
Chronic pharyngitis	472.1	
Pulmonary Tuberculosis	011-011.9	
Other Tuberculosis	012-018.9	
Chronic Obstructive Pulmonary Disease		
Chronic bronchitis	491-491.9	
Emphysema	492-492.8	
Bronchiectasis	494-494.1	
Chronic airway obstruction, not elsewhere classified	496	
Acute bronchitis	466.0	Acute bronchitis only with secondary diagnosis of 491, 492, 494, or 496
Bacterial Pneumonia		
Pneumococcal pneumonia	481	Exclude cases with secondary diagnosis of sickle cell (282.6)
Pneumonia due to Hæmophilus Influenza	482.2	
Pneumonia due to Streptococcus	482.3-482.39	
Bacterial pneumonia unspecified	482.9	
Pneumonia due to other specified organisms	483-483.8	

Condition	Diagnosis	Comments
Bronchopneumonia, organism unspecified	485	
Pneumonia, organism unspecified	486	
Asthma	493	
Congestive Heart Failure		
Heart Failure	428-428.9	Exclude CHF cases with the following surgical procedures: 36.01, 36.02, 36.05, 36.1, 37.5 or 37.7
Malignant hypertensive heart disease with congestive heart failure	402.01	
Benign hypertensive heart disease with congestive heart failure	402.11	
Unspecified hypertensive heart disease with congestive heart failure	402.91	
Acute edema of lung, unspecified	518.4	
Hypertension		
Malignant essential hypertension	401.0	Excludes Hypertension cases with the following surgical procedures: 36.01, 36.02, 36.05, 36.1, 37.5 or 37.7
Unspecified essential hypertension	401.9	
Malignant hypertensive heart disease without congestive heart failure	402.00	
Benign hypertensive heart disease without congestive heart failoure	402.10	
Unspecified hypertensive heart without congestive heart failure	402.90	
Angina		
Intermediate coronary syndrome	411.1	Excludes cases with a surgical procedure (1-86.90)
Other forms of ischemic heart disease	411.8	
Angina pectoris	413-413.9	
Cellulitis		
Cellulitis and abscess of finger and toe	681-681.9	Excludes cases with a surgical procedure (1-86.99), except incision of skin and subcutaneous tissue (86.0) as only listed
Other cellulites and abscess	682-682.9	
Acute lymphandenitis	683	
Other local infections of skin and subcutaneous tissue	686-686.9	
Skin grafts with Cellulitis		Procedures 86.22, 86.27, 86.28, 86.69, 86.75

Condition	Diagnosis	Comments
Diabetes A		
Diabetes with ketoacidosis	250.1-250.13	
Diabetes with hyperosmolar coma	250.2-250.23	
Diabetes with other coma	250.3-250.33	
Diabetes B		
Diabetes with other specified manifestations	250.8-250.83	
Diabetes with unspecified complication	250.9-250.93	
Diabetes C		
Diabetes mellitus without mention of complication	250.0-250.03	
Hypoglycemia (unspecified)	251.2	
Gastroenteritis	558.9	
Kidney/Urine Infection		
Infections of kidney	590-590.9	
Urinary tract infection, site not specified	599.0	
Unspecified disorder of urethra and urinary tract	599.9	
Dehydration – Volume Depletion	276.5	
Iron Deficiency Anemia		Age less than 6 years
Secondary to inadequate dietary iron intake	280.1	
Other specified iron deficiency anemias	280.8	
Iron deficiency anemia, unspecified	280.9	
Nutritional Deficiencies		
Kwashiorkor	260	
Nutritional marasmus	261	
Other severe protein calorie Malnutrition	262	
Rickets, active	268.0	
Rickets, late effect	268.1	
Failure to thrive	783.4	Age less than 1 year
Pelvic Inflammatory Disease	614-614.9	Exclude cases of principal procedure of hysterectomy (68.3 – 68.8)

Condition	Diagnosis	Comments
Dental Conditions		
Diseases of hard tissue and teeth	521-521.9	
Diseases of pulp and periapical tissues	522-522.9	
Gingival and periodontal diseases	523-523.9	
Other diseases and conditions of teeth	525-525.9	
Diseases of oral soft tissue	528-528.9	

ACS Chronic (Ambulatory Care Sensitive Chronic Conditions)

*Diagonoses were grouped under this heading specifically for the **Regional Profiles**. Included in the Ambulatory Care Sensitive Conditons above*

Grand Mal Status, Epilepsy	345–345.99	
Tuberculosis	011–018.99	
COPD, Asthma	491–494.99, 496	
Congestive Heart Failure	428–428.9 402.01-402.11 402.91, 518.4	Excluding with primary procedure 36.01,36.02, 36.05, 361-36.19, 37.5, 37.7–37.79
Hypertension	401.9–401.9 402.00, 402.10 402.90	Excluding with primary procedure 36.01,36.02, 36.05, 36.1–36.19 37.5–37.7-37.79,
Angina	411.1–411.8-411.89, 413–413.99	Excluding with primary procedure 36.01, 36.02, 36.05, 36.1–36.19, 37.5 37.7–37.79
Diabetes B, C	250.0–250.09 250.8–250.93	
Cellulitis with skin graft	DRG 263 or 264	
Dental conditions	521–523.9 525–525.9 528–528.9	

ACS Rapid Onset (Ambulatory Care Sensitive Rapid Onset Conditions)

*Diagnoses were grouped under this heading specifically for the **Regional Profiles**. Included in the Ambulatory Care Sensitive Conditions above*

Convulsions	780.3–780.39	
Severe ENT infections	382–382.9 462, 463 465–465.9, 472.1	Excluding with primary procedure 20.01
Bacterial pneumonia	481, 482.2, 482.3–482.39, 482.9–483.8, 485, 486	
Cellulitis	681–683 686–686.9	Excluding with DRG 263 or 264
Hypoglycemia	251.2	

Condition	Diagnosis	Comments
Diabetes A	250.1–250.39,	Excluding with DRG 263 or 264
Gastroenteritis	558.9	
Kidney/urinary infection	590–590.9, 599.0, 599.9,	
Dehydration	276.5	
Pelvic inflammatory disease	614–614.9	Excluding with primary procedure 68.3–68.89

D. Methods Associated with the Primary Care Access Data and Hospital Discharge Data

Age Adjustment Calculations

The rates calculated in the ***Regional Profiles*** were age adjusted to allow for more valid comparisons between an HSA and State rate. New Hampshire HSAs differ from each other and from the State population as a whole in regard to the age composition of their populations. Some HSAs have "young" populations (a larger percent of persons in younger age groups), while other HSAs are "older" (a larger percent of the population in the retirement years). Since age is one of the most important factors associated with the health of a population (i.e., older persons tend to have poorer health status), it was important to control for the different distributions of age in an HSA before HSA populations were compared to each other or to the State population.

While age adjustment is very beneficial for comparisons between the HSAs and the State, a study of a health status within an HSA might be well served by considering unadjusted rates in order to gain a sense of the magnitude of a specific health issue to a specific area, free of the leveling and comparison compensations that occur with age adjusting.

Table 1 provides data used to illustrate how the age-adjusted rates were calculated for the ***Regional Profiles***. The reader is referred to the table for the following discussion on age-adjustment calculations.

Table 1: Heart Disease Mortality
Plymouth Hospital Service Area
1993-1997 Combined Data (PCAD)

Age Range*	HSA Average Annual Deaths 1993-1997	HSA Population 1995	HSA 1993-1997 Age-Specific Rate (per 1,000)	NH State Population 1995	HSA Population Adjusted to NH State Distribution	Annual Deaths at Adjusted Population Distribution
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<1						
1-14						
15-17						
18-24						
25-44	1.0	4,001	0.25	365,749	4,176	1.0
45-64	4.0	2,706	1.48	239,864	2,739	4.1
65-74	6.0	942	6.37	72,743	831	5.3
75+	19.2	794	24.18	61,141	698	16.9
	30.2	8,443	3.58	739,497	8,443	27.3

* = These are the age ranges for which the PCAD provides data for Heart Disease Mortality. Since heart disease mortality is uncommon before age 25, data for younger ages are not included in the at-risk population range.

Note on the use of Small Numbers: As shown in Column 2, there were five deaths from heart disease during 1993-1997 among those residents of the Plymouth HSA who were between 25-44 years of age, for an average of 1.0 death per year. Deaths from Heart Disease increase with age, e.g., 19.2 deaths per year in the 75+ age range. The five deaths in the 25-44 year age range is a small number and rates based on fewer than 20 events are considered to be highly variable and statistically unreliable (National Vital Statistics Reports, NCHS, CDC, v.47, n.19, 1999). For this reason, the PCAD did not include any calculation of rates unless the incident count of an event (over the five year period in which the events were counted) was at least 20. In developing rates for the **Regional Profiles** this same standard was used and rates for at risk populations were not calculated unless the count of events was 20 or greater. However, by combining data for the entire at risk age group for the five year period in which the events were counted, more totals above 20 were available. For the Plymouth HSA the average annual count of deaths from Heart Disease Mortality for the entire population at risk was 30.2 deaths.

A rate is a ratio of a count of events over a unit of time in a population (the numerator) divided by the total population that was observed (the denominator). In the PCAD methodology the denominator used to calculate the rate of deaths in each HSA and the State was the 1995 population estimate. That year's population was used to estimate the average population for each of the five years of events because it was the midpoint year for the study period, 1993-1997. Thus, in Table 1, the denominator population estimate for those residents at risk of dying from Heart Disease in 1995 in the Plymouth HSA was 8,443 persons.

The calculation of age-adjusted rates makes it possible to compare the rates between an HSA and the State. The proportion of the population in each age range varies from HSA to HSA and between an HSA and the State. Thus, it would be misleading to compare HSA rates to the State rate unless the rates were adjusted for this variation in the distribution of age ranges. In the ***Regional Profiles*** the age-adjustment calculation started with the decision to identify the 1995 State population estimate as the "standard" population, i.e., the population that all rates would be adjusted to. The New Hampshire population estimates for 1995 for the at risk population of the Plymouth HSA are displayed in Column 5.

Step 1: The following steps were taken to adjust the HSA population to the State population distribution:

a) Divide the New Hampshire State population for each at risk age group by the total New Hampshire State population (Column 5). This result is a ratio.
b) Multiply the ratio produced in a) by the total population for the HSA. The results are given in Column 6.

For example for the 75+ age group, the HSA adjusted population was calculated as follows:

$$\text{Adjusted population} = \frac{61141}{739497} * 8443 = 698.1$$

Step 2: The following actions were taken to calculate the counts of HSA annual deaths age-adjusted to the State population:

a) For each age group, multiply the HSA age-specific rate (Column 4*) by the HSA age specific population adjusted to the standard population distribution (Column 6).
b) Divide the product of a) by 1,000.

For example, for the 75+ age group, the HSA annual deaths given in Column 7 were calculated as follows:

Adjusted annual deaths = (24.18 x 698) / 1,000 = 16.9

Step 3: To arrive at the total HSA adjusted annual number of deaths, the annual deaths at adjusted population distribution (Column 7) were totaled:

Total adjusted annual number of deaths = 1.0+ 4.1 + 5.3 + 16.9 = 27.3

Step 4: Finally, to calculate the age-adjusted rate of deaths, we divided the total adjusted annual number of deaths by the total population for the HSA (Column 6) and then multiplied this product by 1,000 to arrive at the age adjusted rate per 1,000 population.

For example:

$$\text{Age-adjusted death rate} = \frac{\text{Column 7 Total}}{\text{Column 6 Total}} \times 1{,}000$$

$$= \frac{27.3}{8443} \times 1{,}000$$

=3.23 deaths per thousand

Confidence Intervals

Confidence intervals are another measure of statistical significance.

Since the rates in the ***Regional Profiles*** were developed from population estimates, it is not certain that the calculated rates are the true rates. Thus, in order to estimate, and state with a

* = Column 4 is the age specific rate for heart disease mortality and is calculated by dividing the average annual counts of events, in this case heart disease deaths, by the 1995 HSA population estimate to arrive at a rate per person. Rates per person are hard to comprehend or compare because the numbers are so small. For the Regional Profiles and the PCAD, all rates were defined as the rate of an event per 1,000 persons within the age groups under consideration. In this example, that is the total estimated population age 25 and older. To obtain this rate, the per-person rate was multiplied by 1,000 and expressed in Column 4 as a rate per 1,000 persons. This rate is also termed the "crude" rate because it has not been adjusted in any way to make it comparable to the rates for other areas. The formula for this calculation is given as

$$\text{Rate} = \frac{\textit{Average annual deaths}}{\textit{At risk population}} \times 1{,}000$$

specific degree of confidence, the range within which the true rate lies it is necessary to developed confidence intervals around the rates.

Referring to Table 1, note that the average of 19.2 heart disease deaths in the Plymouth HSA is a small number. Counts of events that happen this infrequently will vary from year to year in a random way. In order to establish a confidence interval - a range that includes the chance variation that is likely to occur around the "underlying rate" - a 95% confidence interval was calculated for the rates in the ***Regional Profiles***.

95% confidence intervals were calculated using a standard formula (*Community Health Analysis: Global Awareness at the Local Level.* Chapter 4 (p. 81) G.E. Alan Dever, Ph.D., Aspen, 1991). This calculation allows the observation that there is a 95% probability that the true population rate is contained within the confidence interval calculated. The formula allows for random error, but other errors such as incorrect attribution of the cause of death or hometown of the deceased could cause additional variation that the formula will not include in this adjustment.

Confidence Interval Formula for a Population Rate (95% confidence):

$$\text{confidence interval} = \pm 1000 * 1.96 * \sqrt{\frac{p * (1 - p)}{n}}$$

p - the proportion of deaths in the at-risk population
n - the total at-risk population in the HSA

Notice that the count of events per person is used in the formula, and is multiplied by 1,000 at the end of the calculation to move it back to an interval with "per thousand persons" as the unit. Working out the calculation for the heart disease mortality in the Plymouth HSA, the formula becomes:

$$\text{confidence interval} = \pm 1000 * 1.96 * \sqrt{\frac{0.00323 * (1 - 0.00323)}{8443}}$$

$$= \pm 1000 * 1.96 * \sqrt{.000000381}$$

$$= \pm 1.21$$

The confidence interval is 3.23 ± 1.21, where 3.23 is the age adjusted death rate from the prior calculations above. Thus, the range of the confidence interval is from 2.02 to 4.44. This interval is interpreted to mean that there is a 95% certainty that the true population rate of heart disease mortality in the Plymouth HSA is between 2.0 per 1,000 and 4.4 per 1,000. This confidence interval range is displayed for each of the rates developed from the PCAD data in the Tables and Charts sections of the ***Regional Profiles***.

A similar calculation of a confidence interval for the rate of heart disease mortality for the State population results in a 95% confidence interval of 3.7 to 4.0. Since the HSA confidence interval lies within the bounds of the State confidence interval, it cannot be certain that the heart disease mortality rate of the Plymouth HSA population is significantly different from the heart disease mortality rate of the State population, i.e., the observed difference between these two rate estimates could be entirely the result of random variance.

Z-Test Statistic

A statistical test can also be used to determine whether differences between HSA rates and the State rate are significant. In developing the ***Regional Profiles*** the same test of significance was used that was used in the PCAD; i.e., the Z-test (see by Drew and Keeler (*Improving Outcomes in Public Health Practice: Strategy and Methods*; Chapter 11 (p.364) G.E. Alan Dever, PhD, MT, 1997)). This test statistic is used to test whether an observed HSA proportion is statistically equivalent to the State reference value. This test statistic is applicable when rates are NOT independent (PCAD page 12). The formula is presented below

$$\text{Z-test score} = (p - s) * \sqrt{\frac{n}{s * (1 - s)}}$$

p - the event rate per person in the at-risk population in the HSA
s - the event rate per person in the at-risk population in the State
n - the total at-risk population in the HSA

Filling in the Plymouth numbers in this equation gives:

$$\text{Z-test score} = (0.00323 - 0.00386) * \sqrt{\frac{8443}{0.00386 * (1 - 0.00386)}}$$

$$= (-0.00063) * \sqrt{2196000}$$

$$= -0.93$$

If the absolute value of the test statistic exceeds 1.96, it can be concluded that the HSA rate differs significantly at the 95% confidence level from the standard State rate to which it was compared. In this case the absolute value of –0.93 is .93, which does not exceed 1.96. Thus, we come to the same conclusion that we came to when we developed confidence intervals, i.e., we cannot say with any certainty that the Plymouth HSA rate of death from heart disease differs significantly from the State rate of death from heart disease – the State and HSA rates, though different, are statistically comparable.

E. Methods Associated with the 1999 Health Insurance Survey

The 1999 New Hampshire Health Insurance Coverage and Access Survey was a random survey of the non-elderly (less than age 65) population of New Hampshire residents conducted by the survey research firm of Macro International, Inc. Interviews were conducted in English, and one adult who was most knowledgeable about insurance in the family was asked the survey questions for him or herself as well as for other family members. Between June 16, 1999 and September 1, 1999, approximately 11,781 family-level interviews were conducted, representing approximately 28,263 persons. A random sample of families in each hospital service area or HSA, was interviewed. HSAs are described elsewhere in the ***Regional Profiles*** and in the PCAD document.

The overall response rate for the survey, 76 percent, was excellent. (For more information on response rates, please contact the Office of Planning and Research, Department of Health and Human Services. The response rate provided represents the number of families who responded to the survey as a percent of all those families who were eligible to be interviewed.) In addition, a significant share of those who initially refused to participate later agreed to be surveyed. The refusal conversion rate was 22 percent, or approximately twice Macro International's average rage. This is a good indication that Macro International was able to convey the importance of this survey to New Hampshire residents in phone calls made subsequent to initial refusals.

A variety of methods were used to ensure the reliability of the data. Macro International followed best-practice protocols that ensured appropriate interviewing and quality data collection. Macro International developed weights to adjust for various factors that could, if left unadjusted, introduce bias into the estimates. Various adjustments were made to address the design of the survey (which sub-sampled HSAs), non-response (where individuals in certain groups were more or less willing or able to participate in the study), and under-coverage (including an adjustment for those without telephones). (Weights were developed which adjusted for age, sex, and race and ethnicity and the under-coverage associated with the fact that the survey was a telephone survey and missed households without telephones.) Technical assistance was provided by the Robert Wood Johnson Foundation through the Alpha Center for review of important decisions regarding these methods.

Because not every resident of the State was surveyed, the numbers produced using survey data are estimates of the true values. Thus a survey cannot tell you what the exact insurance rate (or any other measure of interest) is. The standard error, which is based on the characteristics of the survey and how willing different individuals are to respond to the survey, as well as various other factors, can be used to estimate a range in which the true uninsurance rate (or other characteristics of interest) falls. Confidence intervals were calculated using the same methodology that was used with the PCAD data.

The wider the confidence interval, the more care needs to be taken in using the information to understand differences in certain measurable characteristics between HSAs and the State.

F. Indicators from the Institute of Medicine and the Centers for Disease Control and Prevention

Centers for Disease Control and Prevention - "Consensus Set of Health Indicators for the General Assessment of Community Health Status - United States"

The Centers for Disease Control and Prevention convened a panel of experts in public health and developed a consensus set of 18 health status indicators "to assist communities in assessing their general health status and in focusing local, state, and national efforts in tracking the year 2000 objectives" (MMWR, 40, 27:449). Their list is as follows:

- Infant mortality rate per 1,000 live births
- Total deaths per 100,000 population
- Motor vehicle crash deaths per 100,000 population
- Work-related injury deaths per 100,000 population
- Suicides per 100,000 population

- Homicides per 100,000 population
- Lung cancer deaths per 100,000 population
- Female breast cancer deaths per 100,000 population
- Cardiovascular disease deaths per 100,000 population
- Reported incidence (per 100,000 population)
  - AIDS
  - Measles
  - Tuberculosis
  - Primary & secondary syphilis
- Percent of low birth weight infants
- Percent of mothers not receiving prenatal care in the first trimester
- Percent of children under 15 living in families at or below the poverty level
- Percent of people living in counties exceeding EPA standards for air quality

Institute of Medicine - Improving Health in the Community, 1997
Proposed Indicators for a Community Health Profile

Sociodemographic Characteristics

- Distribution of the population by age and race/ethnicity
- Number and proportion of persons in groups such as migrants, homeless, or the non-English speaking, for whom access to community services and resources may be a concern
- Number and proportion of persons aged 25 and older with less than a high school education
- Ratio of the number of students graduating from high school to the number of students who entered 9th grade three years previously
- Median household income
- Proportion of children less than 15 years of age living in families at or below the poverty level
- Unemployment rate
- Number and proportion of single-parent families
- Number and proportion of persons without health insurance

Health Status

- Infant mortality rate by race/ethnicity
- Numbers of deaths or age-adjusted death rates for motor vehicle crashes, work-related injuries, suicide, homicide, lung cancer, breast cancer, cardiovascular diseases, and all causes, by age, race, and gender as appropriate
- Reported incidence of AIDS, measles, tuberculosis, and primary and secondary syphilis, by age, race, and gender as appropriate
- Births to adolescents (ages 10-17) as a proportion of total live births
- Number and rate of confirmed abuse and neglect cases among children

Health Risk Factors

- Proportion of 2-year-old children who have received all age-appropriate vaccines, as recommended by the Advisory Committee on Immunization Practices
- Proportion of adults aged 65 and older who have ever been immunized for pneumococcal pneumonia: proportion who have been Immunized in the past 12 months for influenza

- Proportion of the population who smoke. by age, race, and gender as appropriate
- Proportion of the population aged 18 and older who are obese
- Number and type of U.S. Environmental Protection Agency air quality standards not met
- Proportion of assessed rivers. lakes. and estuaries that support beneficial uses (e.g.. fishing and swimming approved)

Health Care Resource Consumption

- Per capita health care spending for Medicare beneficiaries (the Medicare adjusted average per capita cost [AAPCC])

Functional Status

- Proportion of adults reporting that their general health is good to excellent
- During the past 30 days, average number of days for which adults report that their physical or mental health was not good

Quality of Life

- Proportion of adults satisfied with the health care system in the community
- Proportion of persons satisfied with the quality of life in the community